ASSE Standard #1057-2012
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ASSE International

Performance Requirements for

Freeze Resistant Sanitary Yard Hydrants with Backflow Protection

An American National Standard

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ASSE International
Mokena, Illinois

Foreword

This foreword is not considered a part of the standard. However, it is offered to provide background information.

It is currently recognized that the common garden or utility hose, when connected to a potable water supply by means of a hose threaded outlet, constitutes a potential cross-connection. It is also currently recognized that the same cross-connection may exist when a potable water supply is permitted to drain underground.

With specific reference to Freeze Resistant Sanitary Yard Hydrants, this standard has been developed to protect the potable water supply from backflow contamination and ground water contamination.

It has been recognized that five types of yard hydrants need to be considered to protect against freezing. The types considered are: Type 1, which provides protection with two check valves and an atmospheric vent and does not require removal of the hose to provide freeze protection; Type 2, which provides protection with two check valves and an atmospheric vent and requires removal of the hose to provide freeze protection; Type 3, which provides protection with one check valve and an atmospheric vent and does not require removal of the hose to provide freeze protection; Type 4, which provides protection with one check valve and an atmospheric vent and requires removal of the hose to provide freeze protection; and Type 5, which has an air gap or removable backflow protection device and requires removal of the backflow protection device and hose to provide freeze protection.

Although many of the material specifications are detailed within Section 4.1 of this standard, it is the responsibility of the manufacturer and installer to comply with the relevant jurisdictional requirements.

The working group, which developed this standard revision, was set up within the framework of the Product Standards Committee of ASSE International.

Recognition is made of the time volunteered by members of this working group and of the support of the manufacturers who also participated in the meetings for this standard.

The standard does not imply ASSE's endorsement of a product which conforms to these requirements.

Compliance with this standard does not imply acceptance by any code body.

It is recommended that these devices be installed consistent with local codes by qualified and trained professionals.

This standard was promulgated in accordance with procedures developed by the American National Standards Institute (ANSI).

This edition was approved by the ASSE Board of Directors on July 2, 2012 as an ASSE standard.

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Table of Contents

Freeze Resistant Sanitary Yard Hydrant with Backflow Protection

Section I

1.0 General

1.1 Application

The purpose of freeze resistant sanitary yard hydrants (hereinafter referred to as the “device”) is to supply potable water without danger of damage to the device due to freezing, to provide protection of the potable water supply from contamination due to ground water and to prevent backflow in accordance with the backflow prevention device selected. These devices shall only be used on systems where the low-head backpressure does not exceed that generated by an elevated hose equal to or less than 10.0 feet (3.0 m) in height. This device shall not be subjected to continuous pressure. Continuous pressure shall mean twelve (12) hours use in a twenty-four (24) hour period.

1.2 Scope

1.2.1 Description

This standard covers design and performance requirements for freeze resistant sanitary yard hydrants to prevent backflow due to backsiphonage and backpressure. These units shall be classified as follows:

a) Type 1 devices shall consist of two independent checks, force loaded or biased to a closed position, with an atmospheric vent located between the two check valves, which is force loaded or biased to an open position, and a means for attaching a hose. When the hose is attached, the Type 1 device shall be freeze resistant.

b) Type 2 devices shall consist of two independent checks, force loaded or biased to a closed position, with an atmospheric vent located between the two check valves, which is force loaded or biased to an open position, and a means for attaching a hose. When the hose is removed, the Type 2 device shall be freeze resistant.

c) Type 3 devices shall consist of one check valve, force loaded or biased to a closed position, with an atmospheric vent, which is force loaded or biased to an open position, and means for attaching a hose. When the hose is attached, the Type 3 device shall be freeze resistant.

d) Type 4 devices shall consist of one check valve, force loaded or biased to a closed position, with an atmospheric vent, which is force loaded or biased to an open position, and a means for attaching a hose. When the hose is removed, the Type 4 device shall be freeze resistant.

e) Type 5 devices shall consist of a removable mechanical backflow protection device with at least one check valve, force loaded or biased to a closed position, and an atmospheric vent, which is force loaded or biased to an open position, and a means for attaching a hose. When the hose and backflow protection is removed, the Type 5 device shall be freeze resistant and shall not allow a hose to be attached.

1.2.2 Pressure

1.2.2.1 Operating Pressure Range

The devices shall be designed for a minimum working pressure range of 20.0 psi to 100.0 psi (137.9 kPa to 689.5 kPa) or the manufacturer's maximum rated pressure, whichever is greater.

1.2.3 Temperature Range

The devices shall be designed for flow temperatures of 40.0 °F to 140.0 °F (4.4 °C to 60.0 °C) or the manufacturer's maximum rated temperature, whichever is greater.

1.2.4 Connections

1.2.4.1 Outlet Threads

Garden hose connection threads shall be 3/4 NH or 1 NH garden hose couplings in compliance with ASME B1.20.7.

1.2.4.2 Inlet Threads

Pipe threads shall comply with ASME B1.20.1.

1.2.5 Water Flow Capacity and Pressure Loss

Devices shall meet the flow rates and pressure losses that are referenced in Table 1.

1.2.6 Installation and Service

Devices shall be designed and built such that, after installation, repair or replacement of the elastomeric parts shall be accomplished without the need to excavate the soil surrounding the hydrant.

1.3 Reference Standards

- ASME B1.20.1-1983 (R2006), *Pipe Threads, General Purpose (Inch)*
- ASME B1.20.7-1991 (R2003), *Hose Coupling Screw Threads (Inch)*

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Section II

2.0 Test Specimens

2.1 Samples Submitted for Test

The manufacturer shall submit three (3) devices. When a manufacturer wishes to evaluate a series of devices which are identical except for the inlet sizes and length, the manufacturer shall furnish three (3) production quality hydrants of each outlet size having the smallest inlet and longest length. For Section 3.9, details of the fouling procedure shall be provided by the manufacturer. It shall be permitted for the manufacturer to supply a fouling wire separate for installation by the laboratory.

2.2 Samples Tested

The testing agency shall select one (1) of each type or model and size for the full test. Tests shall be performed in the order listed on one (1) device of each size submitted.

2.3 Drawings

Assembly drawings and other data which are needed to enable a testing agency to determine compliance with this standard, together with installation drawings, shall accompany devices when submitted for examination and performance tests under this standard.

2.4 Rejection

Failure of one (1) device shall be cause for rejection of that type or model and size.

Section III

3.0 Performance Requirements and Compliance Testing

3.1 Hydrostatic Pressure Tests

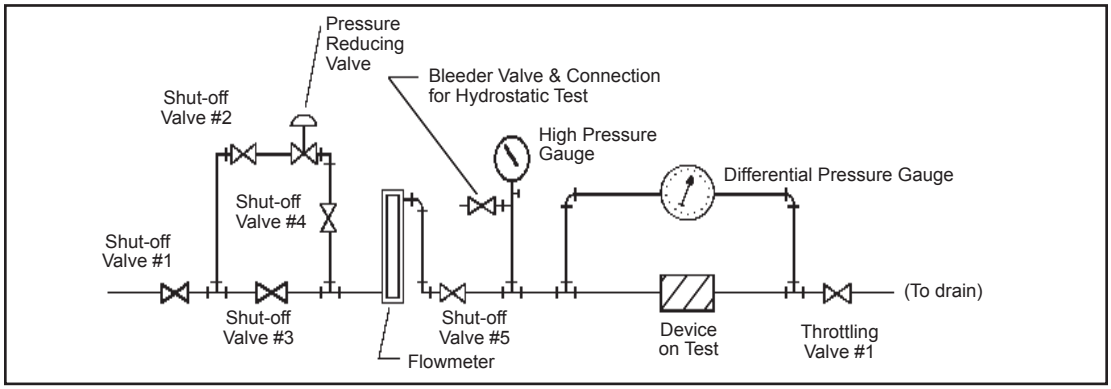
3.1.1 Purpose

The purpose of this test is to determine that the device is capable of withstanding a pressure equal to two (2) times the manufacturer's maximum rated working pressure without leakage or damage.

3.1.2 Procedure

The device shall be installed in the open position on the test system, as shown in Figure 1, with the inlet connected to a water supply at ambient temperature. The device shall be purged of air and then the pressure raised to 200.0 psi ± 5.0 psi (1379.0 kPa ± 34.5 kPa) or two (2) times the manufacturer's maximum rated working pressure, whichever is greater. The pressure shall be held for not less than five (5) minutes, observing throughout the tests for leaks and other indications of damage.

Figure 1



3.1.3 Criteria

Any indication of leakage or damage which prevents full compliance with the remainder of the standard shall result in a rejection of the device.

3.2 Deterioration at Extremes of Manufacturer's Temperature and Pressure Range

3.2.1 Purpose

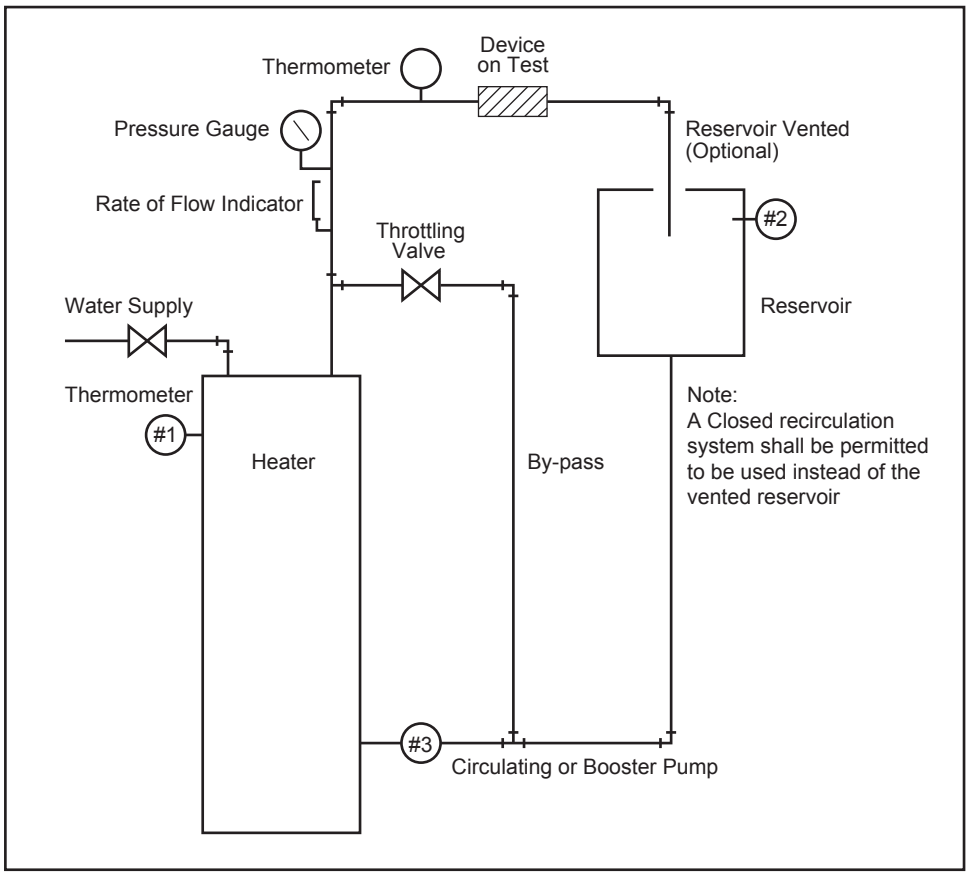
The purpose of this test is to determine that the device's materials are not adversely affected when exposed to water at the extremes of the manufacturer's rated temperature and at its maximum rated pressure.

3.2.2 Procedure

Install the device as shown in Figure 2. Circulate water at 140.0 °F ± 5.0 °F (60.0 °C ± 2.8 °C) or the manufacturer's maximum rated temperature, whichever is greater, through the device on test at a pressure of 100.0 psi ± 5.0 psi (689.5 kPa ± 34.5 kPa) or the manufacturer's maximum rated pressure, whichever is greater, for eight (8) hours per day for ten (10) days. At the request of the manufacturer, the testing laboratory may run this test for eighty (80) continuous hours.

The device on test and the piping system shall be insulated to maintain the required temperature throughout this test. Immediately following the completion of the eighty (80) hours at high temperature, circulate water at 40.0 °F ± 2.0 °F (4.4 °C ± 1.1 °C) at 100.0 psi ± 5.0 psi (689.5 kPa ± 34.5 kPa) or the manufacturer's maximum rated pressure, whichever is greater, for a minimum of one (1) hour.

Figure 2



3.2.3 Criteria

Any indication of a change in the characteristics of the material which prevents full compliance with all requirements of this standard shall result in a rejection of the device.

3.3 Life Cycle Evaluation

3.3.1 Purpose

The purpose of this test is to determine any deterioration of performance upon completion of 5000 cycles of operation.

3.3.2 Procedure

The device shall be installed at a source of ambient water which provides 100.0 ± 5.0 psi (689.5 ± 34.5 kPa) static pressure or the manufacturer's maximum rated pressure, whichever is greater, at the inlet when the device's shut-off valve is closed. The device shall be opened and closed for 5000 cycles of operation at a rate not less than 15 r.p.m. or exceeding 30 r.p.m. for screw-type shut-off valves and a rate between four (4) and eight (8) seconds for devices other than screw-type shut-off valves. The test equipment shall be capable of applying a closing force to the device necessary to produce a seal of the shut-off valve plus ten (10) percent.

3.3.3 Criteria

Any indication of a change in the physical characteristics of the material which would prevent compliance with the remaining requirements of this standard shall result in a rejection of the device. Serviceable leakage from the packing nut shall not be cause for rejection of the device.

3.4 Resistance to Bending

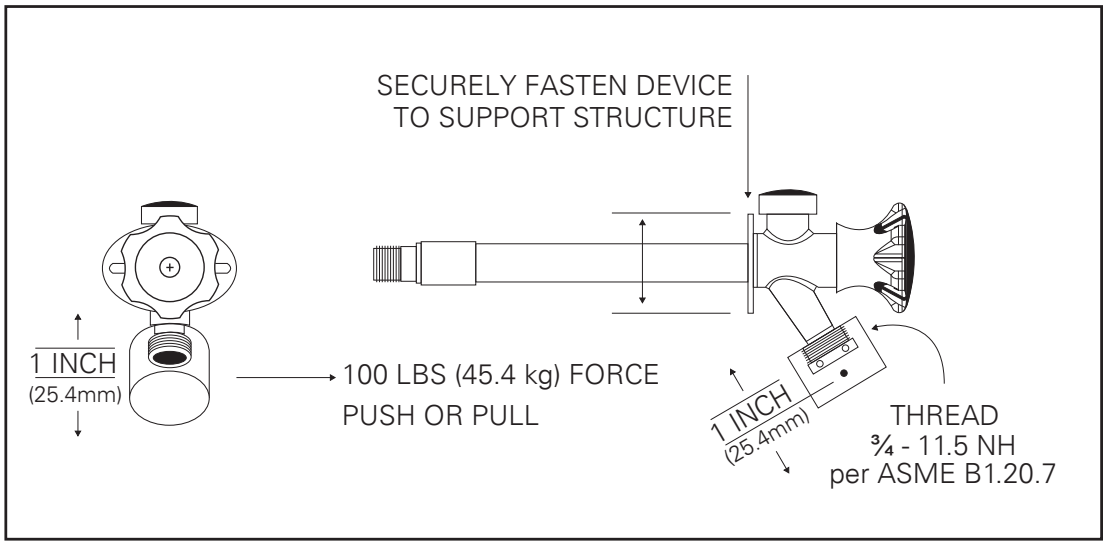
3.4.1 Purpose

The purpose of this test is to determine if the device continues to function without leakage when subjected to a pull of 100.0 pounds (45.4 kg) on a hose applied perpendicular to the device.

3.4.2 Procedure

Install the device per the manufacturer's installation instructions. Attach an o-ring seal and test mandrel to the outlet of the device. Pressurize the device with ambient water to 100.0 psi ± 5.0 psi (689.5 kPa ± 34.5 kPa) or the manufacturer's maximum rated pressure, whichever is greater. Apply a force of 100.0 pounds (45.4 kg) to the mandrel 1.0 inch (25.4 mm) from the outlet end of the device per Figure 3. Hold for three (3) minutes.

Figure 3



3.4.3 Criteria

Any indication of external leakage shall result in rejection of the device. Any fracture in the body of the device shall result in a rejection of the device.

3.5 Freeze Resistant Capabilities

3.5.1 Purpose

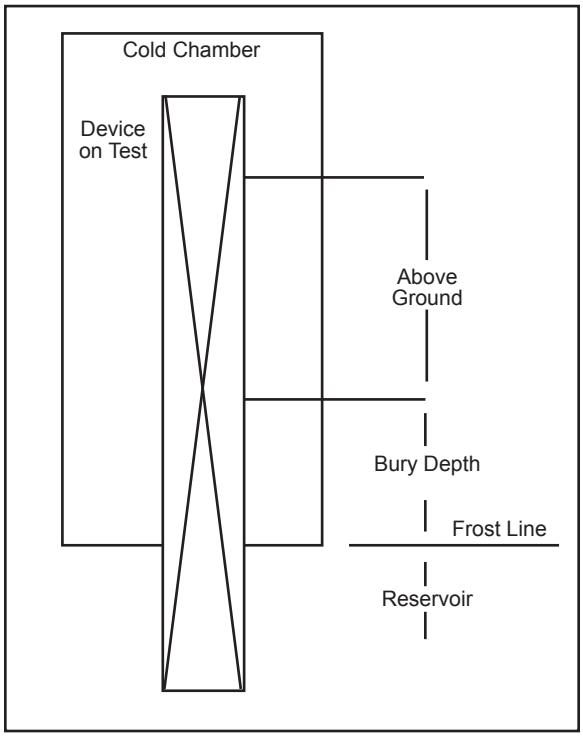
The purpose of this test is to determine if the device is capable of discharging water in subfreezing temperatures.

3.5.2 Procedure

The device shall be installed, as shown in Figure 4, per the manufacturer's instructions, with all of the device that extends above the frost line contained within a cold chamber and with the portion below the frost line located outside the cold chamber at ambient room temperature. The inlet to the device shall be connected to a water supply at ambient temperature. The cold chamber shall be maintained at 0.0 °F ± 2.0 °F (-17.8 °C ± 1.1 °C) during the test to simulate

an actual installation in a subfreezing climate. Follow the manufacturer's instructions, if noted, to "winterize" the device. After sixty (60) minutes, the device shall be turned to the full open position and a minimum of 3.0 GPM (0.2 L/s) of water shall be discharged. This test is to be conducted at 20.0 psi (137.9 kPa) supply pressure and again at 100.0 psi (689.5 kPa) supply pressure or the manufacturer's maximum rated pressure, whichever is greater.

Figure 4



3.5.3 Criteria

Failure of the device to discharge a minimum of 3.0 GPM (0.2 L/s) of water shall result in a rejection of the device. At no time shall the device externally drain water below the ground level. Any external drainage or leakage of water below the ground level shall result in a rejection of the device.

3.6 Atmospheric Vent Leakage

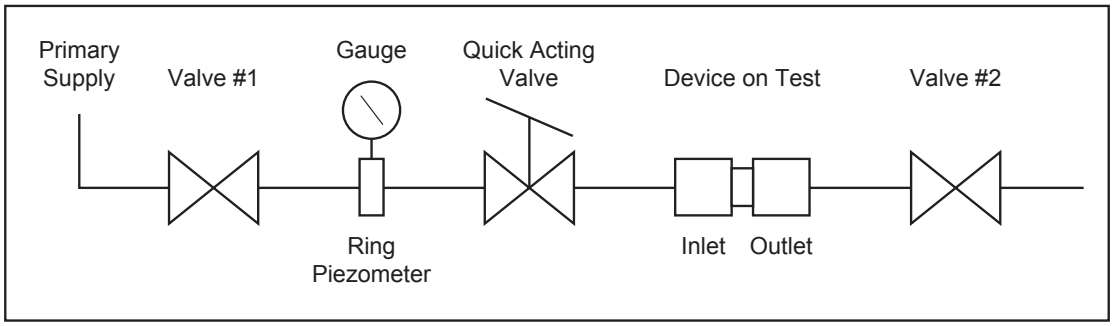
3.6.1 Purpose

The purpose of this test is to determine if there is leakage from the atmosphere.

3.6.2 Procedure

The device shall be installed in a test system as shown in Figure 5, with Valve #1 and Valve #2 in the closed position. Valve #2 shall be opened and then the supply valve shall be opened to provide 20.0 psi (137.9 kPa) pressure or the manufacturer's stated minimum operating pressure, whichever is lower, to the device. Open the device to the full open position.

Figure 5



3.6.3 Criteria

Any leakage at the vent ports from 20.0 psi (137.9 kPa) or the manufacturer's stated minimum operating pressure, whichever is lower, to full open position shall result in a rejection of the device.

3.7 Backflow Through Inlet Check Valve (Types 1 and 2)

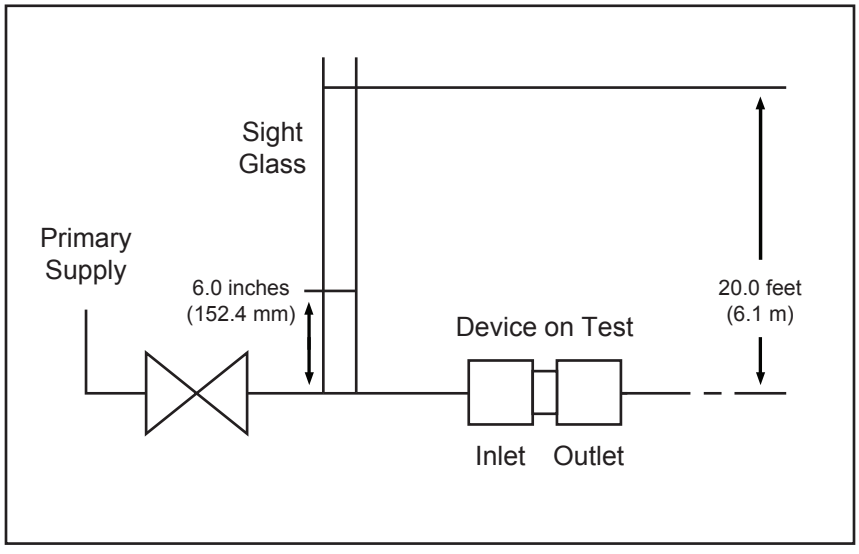
3.7.1 Purpose

The purpose of this test is to determine if backflow into the inlet of the device occurs when the atmospheric vent port(s) are sealed closed, the outlet check valve is held open and pressure is applied to the outlet of the device.

3.7.2 Procedure

The outlet check valve shall be removed or held open and the atmospheric vents shall be sealed. Install the device as shown in Figure 6. Open the water supply to raise the water level in the sight glass to 6.0 inches (152.4 mm) above the centerline of the outlet check valve and close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass. Open the supply valve to raise the water level in the sight glass to 20.0 feet (6.1 m) above the center line of the outlet check valve and then close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass.

Figure 6



3.7.3 Criteria

Any loss of level in the sight glass or leakage through the inlet check valve into the inlet shall result in a rejection of the device.

3.8 Backflow Through Outlet Check Valve (All Types)

3.8.1 Purpose

The purpose of this test is to ensure that the outlet check valve prevents flow at 10.0 feet (3.0 m) of backpressure.

3.8.2 Procedure

The device shall be installed as shown in Figure 6. For Types 3, 4 and 5, seal the atmospheric vents closed. Open the supply valve to raise the water level in the sight glass to 6.0 inches (152.4 mm) above the centerline of the outlet check valve, then close the supply valve. Hold for five (5) minutes while observing the water level in the sight glass. Open the supply valve to raise the water level in the sight glass to 10.0 feet (3.0 m) above the centerline of the outlet check valve, then close the supply valve. Hold for not less than five (5) minutes while observing the water level in the sight glass.

3.8.3 Criteria

Any loss of water level in the sight glass or leakage through the outlet check valve, as observed at the atmospheric vents, shall result in a rejection of the device.

3.9 Backsiphonage

3.9.1 Purpose

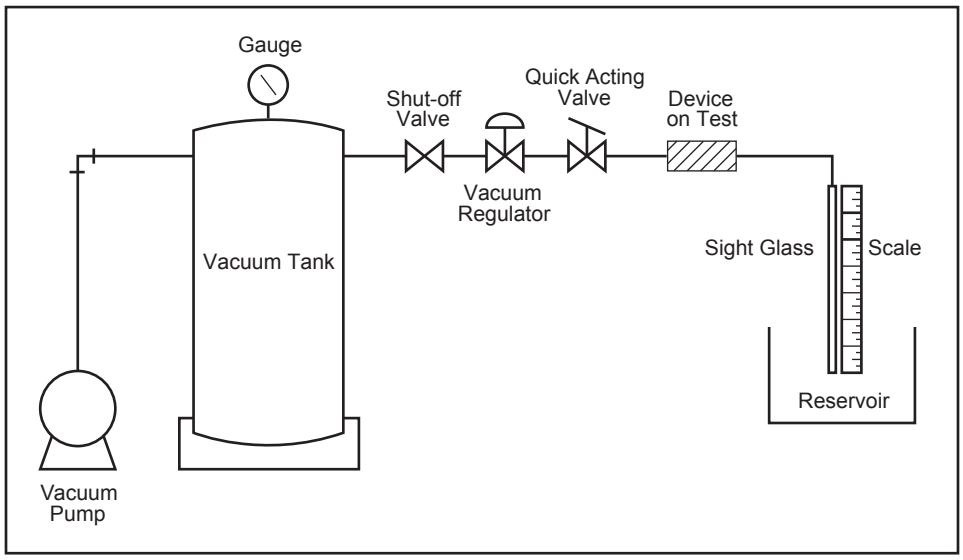
The purpose of this test is to ensure that the backflow prevention device prevents backflow due to backsiphonage.

3.9.2 Procedure

All check valves shall be fouled with a 0.032 inch (0.813 mm) diameter fouling wire (see Appendix A for fouling wire examples). Install the device in the open position, as shown in Figure 7, with a sight glass of 0.5 inch (12.7 mm) internal diameter. The following vacuum loads shall be applied in sequence:

(1) Apply and hold a vacuum of 25.0 inches (635.0 mm) of mercury for five (5) minutes;
(2) Raise the vacuum slowly from 0.0 inches (0.0 mm) to 25.0 inches (635.0 mm) of mercury and then slowly reduce it to 0.0 inches (0.0 mm) of mercury; and
(3) Create a surge effect by opening and closing a quick acting valve. The applied vacuum shall vary between 0.0 inches (0.0 mm) to 25.0 inches (635.0 mm) of mercury during the test.

Figure 7



3.9.3 Criteria

A rise of water in the sight glass, including a bowing of the meniscus, exceeding a rise of 3.0 inches (76.2 mm) above the water in the reservoir shall result in a rejection of the device.

3.10 Backsiphonage and Backpressure (Types 1 and 2)

3.10.1 Purpose

The purpose of this test is to ensure that the backflow prevention device prevents backflow due to backsiphonage.

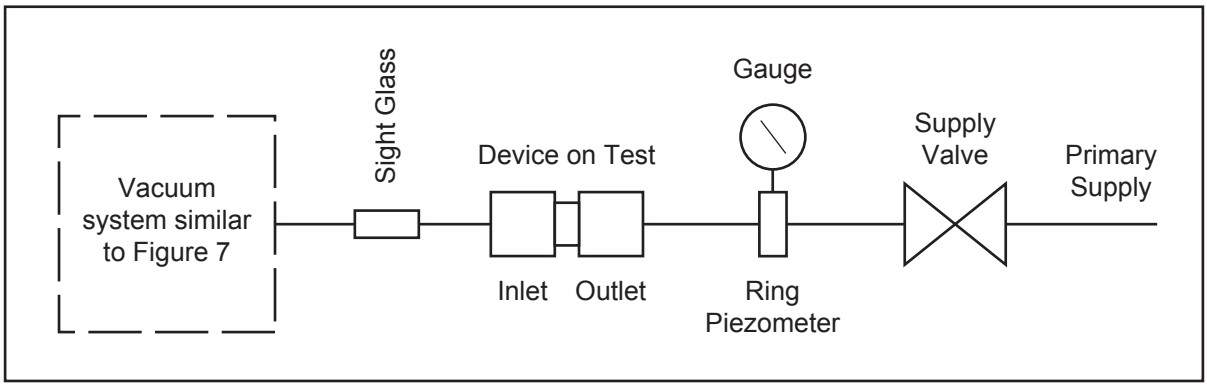
3.10.2 Procedure

The inlet check valve shall be fouled with a 0.032 inch (0.813 mm) diameter fouling wire (see Appendix A for fouling wire examples). The outlet check valve shall be in its normal closed position. Install the device as shown in Figure 8 and open the supply valve to maintain 3.0 psi (20.7 kPa) at the outlet of the device. The following vacuum loads shall be applied in sequence:

(1) Apply and hold a vacuum of 25.0 inches (635.0 mm) of mercury for five (5) minutes;
(2) Raise the vacuum slowly from 0.0 inches (0.0 mm) to 25.0 inches (635.0 mm) of mercury and then slowly reduce it to 0.0 inches (0.0 mm) of mercury; and
(3) Create a surge effect by opening and closing a quick acting valve. The applied vacuum shall vary between 0.0 inches (0.0 mm) to 25.0 inches (635.0 mm) of mercury during the test.

Repeat the test with the outlet check valve fouled with a 0.032 inch (0.813 mm) diameter fouling wire (see Appendix A for fouling wire examples). The inlet check valve shall be in its normal closed position.

Figure 8



3.10.3 Criteria
Any indication of flow of water from the outlet of the device into the inlet piping shall result in a rejection of the device.

3.11 Relief of Intermediate Chamber Pressure (Types 1 and 2)

3.11.1 Purpose
The purpose of this test is to determine if the intermediate chamber pressure will be relieved when the device is pressurized to 100.0 psi (689.5 kPa) or the manufacturer's maximum rated working pressure, whichever is greater, and the inlet pressure suddenly drops to 0.0 psi (0.0 kPa).

3.11.2 Procedure
Install the device as shown in Figure 5. Open Valve #1 and Valve #2 and flow water through the device to purge it of air. Close Valve #2 and raise the pressure to 100.0 psi (689.5 kPa) or the manufacturer's maximum rated working pressure, whichever is greater. Close Valve #1. Open the quick acting valve to drop the pressure at the inlet of the device to atmospheric pressure. The pressure in the intermediate chamber shall be dissipated quickly, as indicated by the discharge of water through the atmospheric vents.

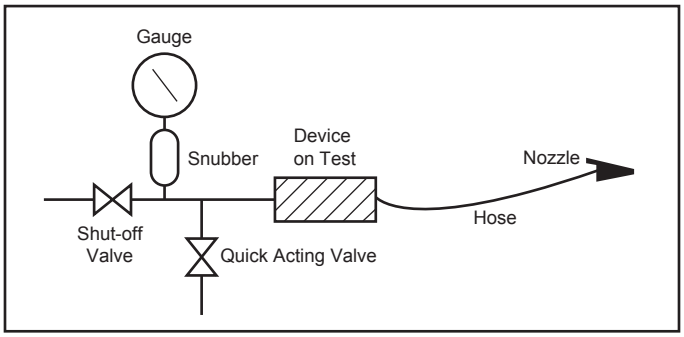
3.11.3 Criteria
Failure of the atmospheric vents to open and dissipate pressure in the intermediate chamber shall result in a rejection of the device.

3.12 Backflow Prevention (Types 3, 4 and 5)

3.12.1 Purpose
The purpose of this test is to determine if the atmospheric vent opening relieves the outlet pressure when the supply pressure drops to 0.0 psi (0.0 kPa).

3.12.2 Procedure
The device shall be installed in a test system, as shown in Figure 9. The hose connected to the outlet of the device shall be 0.5 inch (12.7 mm) nominal inside diameter, 25.0 feet (7.6 m) in length and having a quick closing nozzle on its discharge end. Purge the test set-up of air and then pressurize the system to 100.0 psi (689.5 kPa) or the manufacturer's maximum rated working pressure, whichever is greater, with water at ambient temperature. The supply valve shall be closed and then a quick-acting valve shall be opened to drop the pressure in the inlet of the device to 0.0 psi (0.0 kPa). The pressure in the hose line shall be dissipated quickly by the discharge of water through the vent ports.

Figure 9



3.12.3 Criteria

Failure of the device to begin to relieve the outlet pressure through the vent port when the supply pressure reaches 0.0 psi (0.0 kPa) shall result in the rejection of the device.

3.13 Backflow Preventer Attachment Requirements

3.13.1 Purpose

The purpose of this test is to ensure that the manufacturer has provided a means of securing the mechanical backflow preventer or, where removable, shall provide a means to prohibit future hose connections.

3.13.2 Procedure

Attempt to remove the mechanical backflow preventer by applying a torque of 180.0 in-lb (20.3 N•m) at the base of the mechanical backflow preventer. Mechanical backflow preventers which cannot be removed by this method shall be deemed non-removable. Where the mechanical backflow preventer is removed, the remaining outlet shall have a minimum outside cross-sectional dimension of at least 1.0 inch (25.4 mm). Attempt to attach a garden hose with threaded connectors to the outlet of the device.

3.13.3 Criteria

Any indication that the backflow preventer can be removed by applying a torque of less than 180.0 in-lb (20.3 N•m) or, once removed, that a garden hose with threaded connectors can be reattached to the outlet shall result in a rejection of the device.

3.14 Flow Rates and Pressure Loss

3.14.1 Purpose

The purpose of this test is to determine the pressure loss at rates of flow as identified per Table 1.

3.14.2 Procedure

The device shall be installed in the open position in the test system, as shown in Figure 1, equipped with a means for accurately measuring the rate of ambient water flow and pressure loss across the device. Purge the system of air and close the throttling valve. The throttling valve shall then be slowly opened until the 25.0 psi (172.4 kPa) pressure differential is reached.

Table 1

Outlet of Device	Minimum Flow Rate		Maximum Allowable Pressure Loss	
NH	GPM	L/s	psi	kPa
¾	4.00	0.25	25.0	172.4
1	8.00	0.50	25.0	172.4

3.14.3 Criteria

Failure of the device to meet the flow requirements of Table 1, at or below the maximum allowable pressure loss of 25.0 psi (172.4 kPa), shall result in a rejection of the device.

Section IV

4.0 Detailed Requirements

4.1 Materials

4.1.1 Materials in Contact with Water

Solder and fluxes containing lead in excess of 0.2% shall not be used in contact with potable water.

4.1.2 Corrosion Resistance

Internal moving parts shall be of a material having a corrosion resistance at least equal to an alloy of not less the 58% copper.

4.2 Instructions

Instructions shall accompany each device and shall provide all information, including illustrations, necessary for correct installation, operation, maintenance and repair of the device.

4.3 Marking

4.3.1 Each device shall have the following information marked on it where it will be visible after the device has been installed:

a) Name of manufacturer/marketer or trademark.
b) Type and model number of the device.

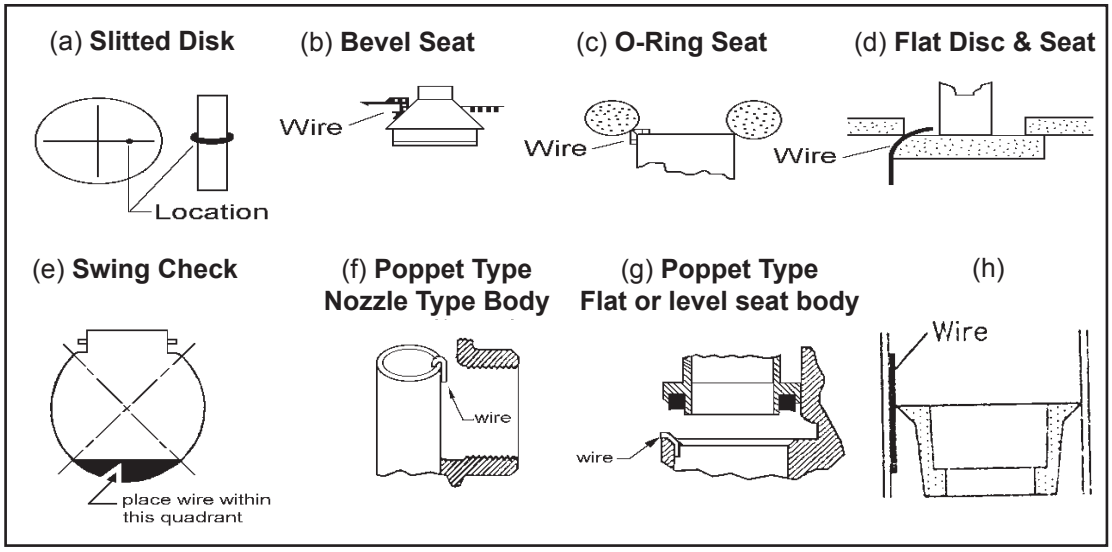
4.3.2 Markings shall be cast, etched, stamped or engraved on the body of the device or on a corrosion resistant material plate securely fastened to the device.

Section V

5.0 Definitions

Definitions not found in this section are located in the Plumbing Dictionary, Sixth Edition, published by ASSE.

Appendix A


(a) Slitted Disk
Location
(b) Bevel Seat
Wire
(c) O-Ring Seat
Wire
(d) Flat Disc & Seat
Wire
(e) Swing Check
place wire within this quadrant
(f) Poppet Type Nozzle Type Body
wire
(g) Poppet Type Flat or level seat body
wire
(h)
Wire

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